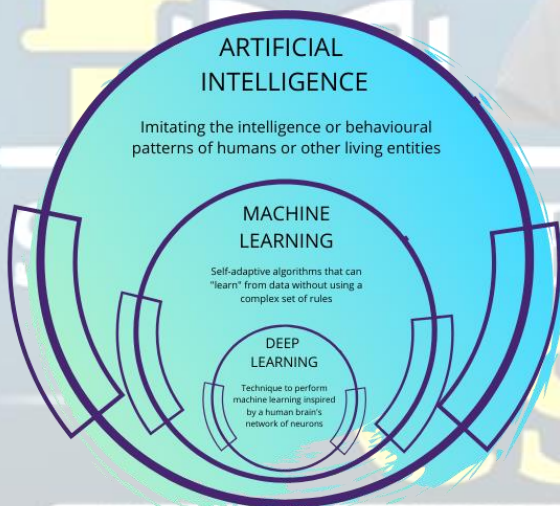
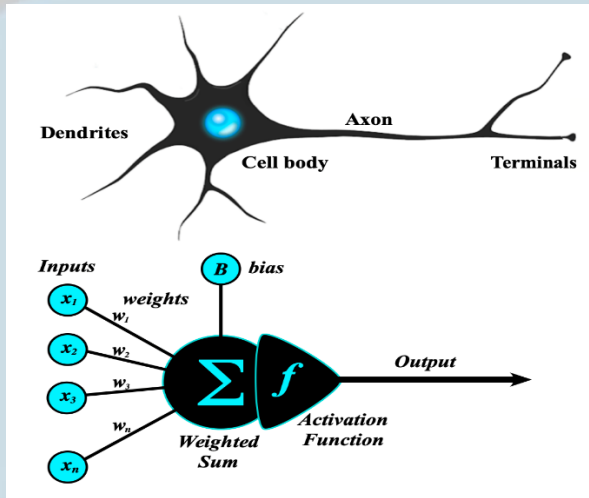


## Use of deep learning and antibiotic resistance



- Using these neural networks to make predictions has two steps: training and testing.
- In training, the network is provided with a large amount of annotated inputs.
- For example, if the network is being trained to identify pictures of cats, it is provided with many such pictures labeled "cat".
- If deep learning can identify potential antibiotics and also explain what substructures may contribute to their antibiotic activity, scientists can synthesize and test compounds with these substructures faster.

### Against MRSA (methicillin-resistant *Staphylococcus aureus*) and VRE

- While determining the rationales for 380 compounds from the set of 3,646, the team found some that had not been previously reported and which the GNNs predicted could confer antibiotic properties to molecules.
  - One such rationale was N-[2-(2-chlorophenoxy) ethyl aniline
  - On further tests, two compounds containing this rationale were found to inhibit the growth of MRSA cultures by changing the concentration of hydrogen ions across the bacterial cell membrane.
- All artificial neural networks are made of artificial 'neurons'.
  - These are algorithms that receive an input, perform a computation, and relay the output.
  - Deep-learning neural networks have three or more layers of such 'neurons'.

- Notably, the compounds were also effective against vancomycin-resistant enterococci (VRE), a bacteria responsible for more than 5,400 deaths in the U.S. in 2017.

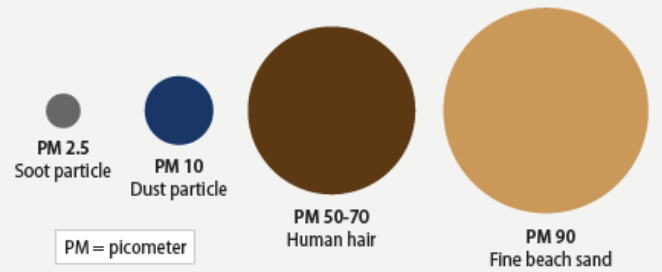
## The Hindu

### USA Steps against soot pollution

- The Biden administration is setting tougher standards for deadly soot pollution, saying that reducing fine particulate matter from tailpipes, smokestacks, and other industrial sources could prevent thousands of premature deaths a year.
- Environmental and public health groups hailed the new Environmental Protection Agency rule finalized as a major step in improving the health of Americans, including future generations.
- Industry groups warned it could lead to loss of manufacturing jobs and even shut down power plants or refineries.



FIGURE 1  
How big is particle pollution?



Source: U.S. Environmental Protection Agency

- The rule sets an air quality level that states and counties must achieve in the coming years to reduce pollution from power plants, vehicles, industrial sites, and wildfires.

## The Hindu

### Northern Ireland vs Ireland



### How did Northern Ireland come into being?

- Northern Ireland was the site of a 30-year civil war (1968-1998) known as

'The Troubles' between the Republicans and the Unionists, which killed over 3,500 people.

- It also had a religious aspect to it with the Republicans being mostly Catholic and the Unionists being largely Protestants.
- Northern Ireland was formerly part of the Ulster province, which lies to the north of modern-day Ireland.
- The religious war that was being waged in much of Europe at the time, between the Protestants and the Catholics, made its presence felt in Ulster as well.
- However, a much stronger resistance was brewing. Ireland at the time was under the rule of England.
- The growing resistance against the colonial English rule, especially after the Potato Famine of 1845 where over 1 million Irish people died due to disease and starvation, cemented these sectarian and religious differences.
- Finally, in 1916, in the middle of the First World War, during Easter week, Ireland rose in arms against colonial rule under the leadership of the Irish Republican Army (IRA).
- After a bloody war, it was able to gain independence from England with the Anglo-Irish Treaty of 1921.

- Finally, on April 10, 1998, the Good Friday Agreement was signed in Belfast bringing to an end the 30-year-old civil war in Northern Ireland.

### What is the Good Friday Agreement?

- The Good Friday Agreement is a unique peace treaty in that it conceded to most of the demands from both sides of the conflict.
- The treaty had three main aspects that the Northern Ireland government would be formed on the sovereign wishes of both Republicans and the Unionists and that they would share governance equally;
- that the people of Northern Ireland could seek reunification with Ireland at any time subject to a referendum;
- and that the citizens of Northern Ireland can seek Irish or British nationality or both. It also abolished border checks
- and encouraged the freedom of movement of people across the U.K. and Ireland.

- The Hindu

### Derivative trading

- **What is the Meaning of Derivative Trading?**
- A derivative is a formal financial contract that allows an investor to

buy and sell an asset for a future date.

- The expiry date of a derivative contract is fixed and predetermined.
- Derivative trading in the share market is better than buying the underlying asset since the gains can be substantially inflated.
- Derivative contracts are of two types futures and options. In essence, both are the same since the investor, and the seller predict the price of the underlying asset for a specific future date.
- But, futures and options are different in that, in futures, both the buyer and seller are under the legal obligation to honor the contract on expiry.
- However, in the case of options, the buyer or seller can buy/sell before expiry by exercising their rights or letting the contract expire without any exercise of rights.
- Options are of two types - Call option and Put option. Investors buy a Call option when they are confident that the underlying asset will go up.
- In contrast, they buy a Put option when they feel certain that the price of the underlying asset will come down.

## Types of Derivatives

- The Derivatives definition is a financial contract between two parties that derive its value from an underlying asset such as stocks, currencies, commodities, etc.
- There are four types of assets tradable in the derivatives market.
- **Options Contract**  
An options contract gives the buyer the right but not the obligation to buy/sell the underlying securities to a different investor over a predetermined period, depending on the type of options contract. The security price in the options contract is known as the strike price, and the seller of the contract is called the option's writer.
- In an options contract, the buyer can pass on the exercise right as they are not obliged after paying the premium to the option's writer. There are two types of options contracts: A call option and a put option.
- **Futures Contract**  
A futures contract in the derivatives meaning binds both parties legally to exercise the agreement within the predefined period.
- The involved parties set a quantity of the underlying assets and a price

payable by the buyer at a specific date in the future.

- Unlike options, the buyer or the seller of futures must exercise the contract before the expiry date. The futures contracts include currency futures, index futures, commodity futures, etc.

- **Forwards**

They are financial contracts between two parties based on a predetermined quantity and price of the underlying securities to be executed before the expiry date.

- Like futures, forwards obligate both parties to exercise the contract before the expiry date.

- However, investors can only trade such contracts using an Over-The-Counter trading market rather than a supervised stock market exchange.

- **Swaps**

These financial instruments allow two parties to swap or exchange their financial obligations or liabilities. Both parties set the cash flow within the contract based on a rate of interest.

- In this contract, one cash flow is usually fixed while the other varies per benchmark interest rate.

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